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Supplement
to the
SERVICE BINDER
for the
Kodak X-Omat 480 RA PROCESSOR
Service Code: 3228
with the
5000 BOARD

Important
Qualified service personnel must repair this equipment.

HEALTH IMAGING

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This equipment includes parts and assemblies sensitive to damage from electrostatic discharge. Use caution to prevent damage during all service procedures.

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Section 1: Introduction

The 500 BOARD cannot continue to be made. Parts are not available. The 5000 BOARD is a replacement. The 5000 BOARD is larger than the 500 BOARD, but the MOUNTS and the CONNECTORS for both BOARDS are the same. When the 5000 BOARD is a replacement for a 500 BOARD, installing new software and the CLOCK MEMORY MODULE is necessary. The new software does not change the operation of the PROCESSOR, and additional error codes improve diagnostic procedures.

Important

Installing a 5000 BOARD in a PROCESSOR is not necessary if the 500 BOARD is operating correctly. When the 500 BOARD is no longer available, the 5000 BOARD is sent automatically. The following publications are available to provide service on the 5000 BOARD.

Publication	No.
INSTALLATION INSTRUCTIONS for the 5000 BOARD on the *Kodak X-Omat* 180 LP and LPS PROCESSORS, the *Kodak X-Omat* 270 RA and 480 RA PROCESSORS, and the *Kodak X-Omat* 3000 RA INTEGRATED PROCESSOR	6E5138
INSTALLATION INSTRUCTIONS for the OPERATING SOFTWARE DISK on the *Kodak X-Omat* 180 LP and LPS PROCESSORS, the *Kodak X-Omat* 270 RA and 480 RA PROCESSORS, and the *Kodak X-Omat* 3000 RA INTEGRATED PROCESSOR with the 5000 BOARD	4E9709
Supplement to the SERVICE BINDER for the *Kodak X-Omat* 480 RA PROCESSOR with the 5000 BOARD	1F1299

Section 2: Diagnostics for the 5000 BOARD in the PROCESSOR

Using the Diagnostics

Internal Diagnostics

Introduction

When you enter the diagnostic menu, the software:

- de-energizes
  - all HEATERS
  - all PUMPS
  - all SOLENOIDS
  - BLOWER and DRIVE MOTORS
  - SAFELIGHT OUTLET
- disables the error code detection

You can use the internal diagnostics to energize and de-energize electrical components. When you energize a component, it will automatically de-energize in 4 minutes.

To view the options that are available from the D1, D2, and D3 Menus, see "Menus for the Internal Diagnostics" on Page 8.

Executing the Internal Diagnostics

READY				
DRYER TEMP		SELECT CYCLE	MORE	GO TO SETUP

[1] At the main menu, press [GO TO SETUP].

1	2	3	4	CANCEL REQUEST

[2] Enter the access code.

Note

If the customer has not changed the code, it is 4213.

^	v	CYCLE	MORE	DONE/ RETURN

[3] Press [MORE].

INFO	SETUP	OPTIONS		DONE/ RETURN

[4] Press [INFO].

USAGE	DIAG	SW VERSION	MORE	DONE/ RETURN

[5] Press [DIAG] to display the first diagnostic menu. See “Menus for the Internal Diagnostics” on Page 8.

For access to additional screens, select:

- [USAGE] for the type and quantity of film and chemicals used in the PROCESSOR
- [SW VERSION] for the software version number for the following programs for the 5000 and 5600 BOARDS:
  - Boot program
  - Main program
- [MORE] for the total number of hours the:
  - PROCESSOR is energized
  - DRIVE MOTOR is energized
- [DONE/RETURN] until you return to the main menu

Note

From the D1 Menu, you can:

- advance to the History and Frequency Error Logs
- monitor the FILM DETECTOR SWITCHES
- monitor the SENSORS
- advance to the D2 Menu
- return to the main menu

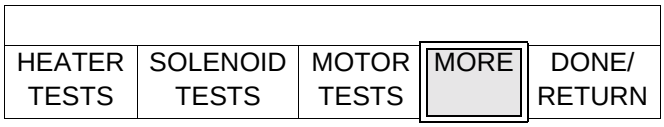
VIEW ERRORS	FILM DETECT	SENSOR TESTS	MORE	DONE/ RETURN

[6] Press [MORE] to display the D2 Menu.

Note

From the D2 Menu, you can:

- energize and de-energize
  - HEATERS
  - SOLENOIDS
  - MOTORS
- advance to the D3 Menu
- return to the main menu



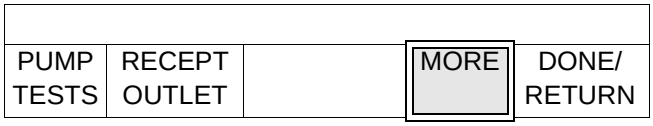
[7] Press [MORE] to display the D3 Menu.

Note

When you energize the HEATERS, energizing the RECIRCULATION PUMPS is necessary to prevent the OVER-TEMPERATURE THERMOSTAT from opening.

From the D3 Menu, you can:

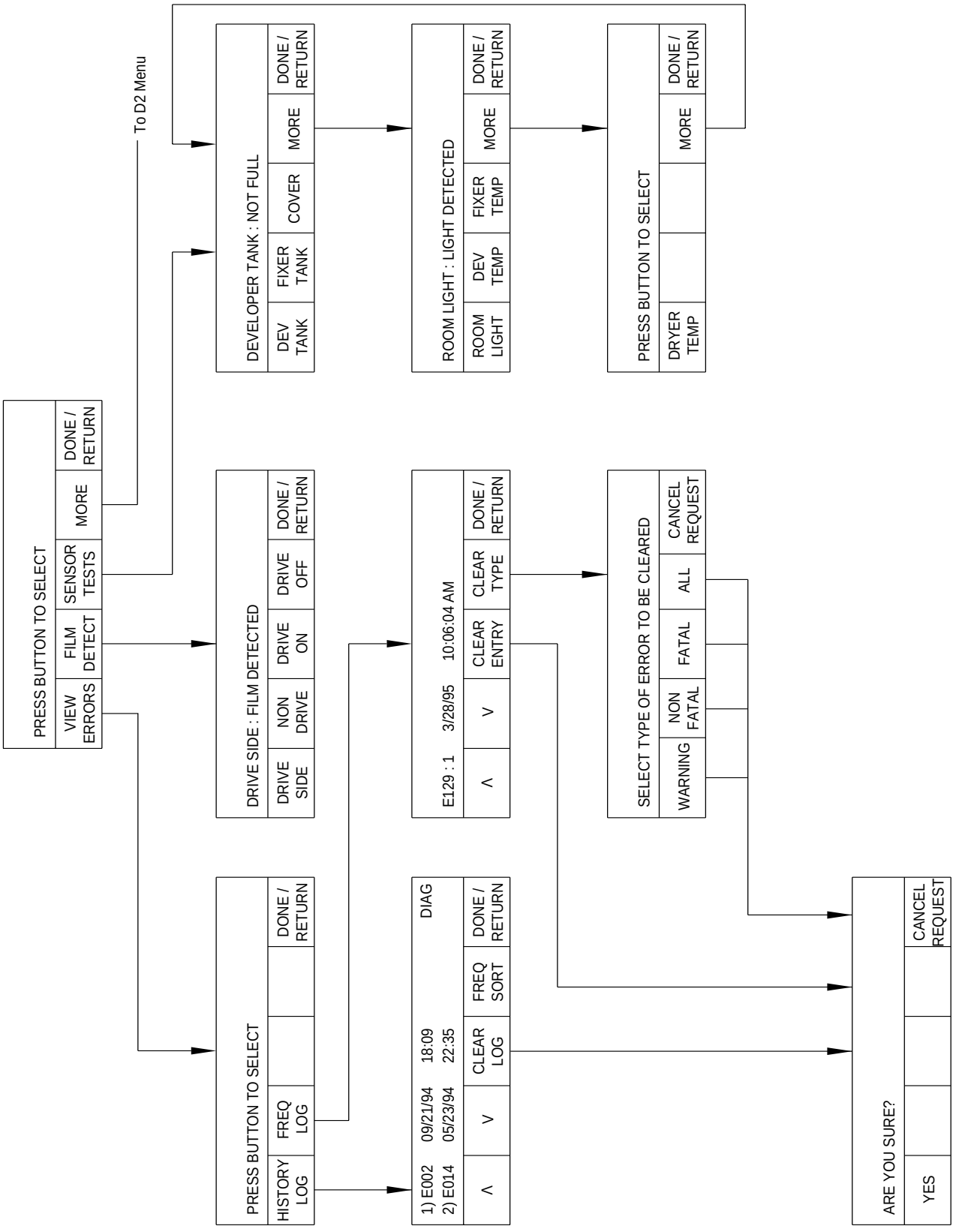
- energize and de-energize the PUMPS and the RECEPTACLE OUTLET
- do a calibration of the LEDs on the 5600 BOARD
- check the operation of the SENSORS on the 5600 BOARD
- return to the D1 Menu
- return to the main menu



[8] Press [MORE] to return to the D1 Menu.

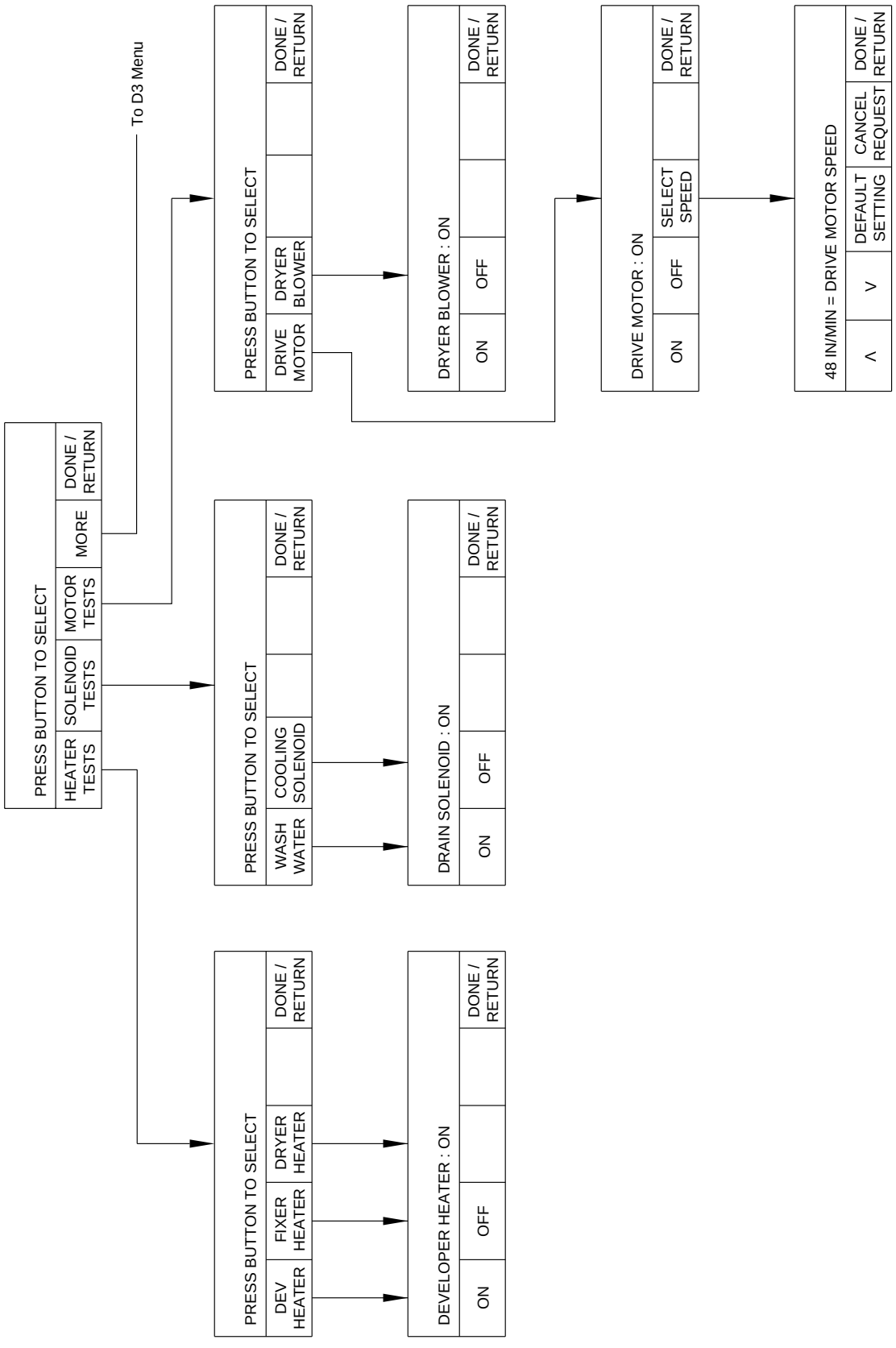
Menus for the Internal Diagnostics

D1 Menu



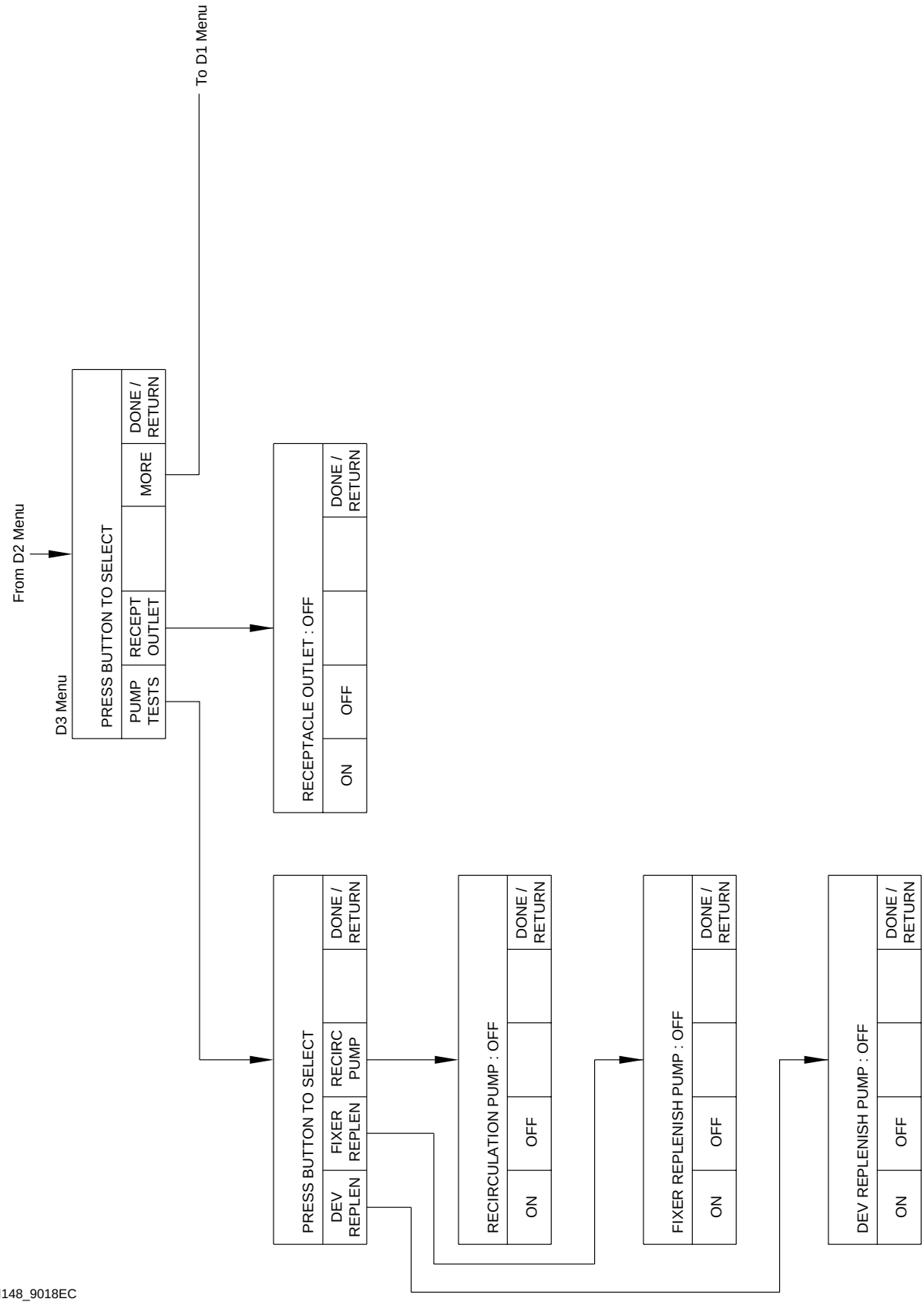
150_9039EC

D2 Menu



H150_9043EC

D3 Menu


From D2 Menu
D3 Menu
PRESS BUTTON TO SELECT
PUMP TESTS
RECEPT OUTLET
MORE
DONE / RETURN
To D1 Menu
RECEPTACLE OUTLET : OFF
ON
OFF
DONE / RETURN
PRESS BUTTON TO SELECT
DEV REPLEN
FIXER REPLEN
RECIRC PUMP
DONE / RETURN
RECIRCULATION PUMP : OFF
ON
OFF
DONE / RETURN
FIXER REPLENISH PUMP : OFF
ON
OFF
DONE / RETURN
DEV REPLENISH PUMP : OFF
ON
OFF
DONE / RETURN
H148_9018EC

Reports

Introduction

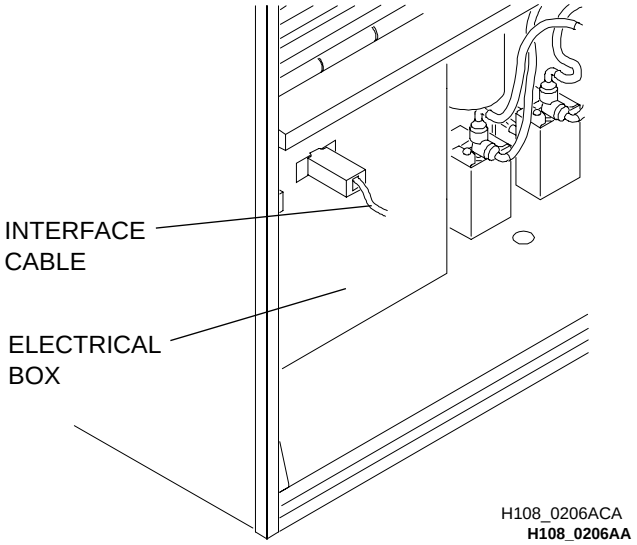
The equipment software enables you to make copies of the following reports.

- Status Report, which includes information about:
  - Processing Parameters
  - Options
  - Automatic Starting and Stopping Times
  - Software Versions
  - Miscellaneous Information
- Usage Report, which includes information about:
  - Film
  - Chemicals
- Log Report, which provides information about errors in 2 formats:
  - Frequency
  - History

The following components are necessary to make printouts of reports:

- CABLES
  - PRINTER ADAPTER CABLE TL-5004
  - INTERFACE CABLE TL-4391
- PRINTER
  - 9600 baud
  - 8 data bits
  - no parity
  - serial interface
  - XON/XOFF protocol

Making Printouts of Reports



[1] Connect:

- INTERFACE CABLE TL-4391 to the PROCESSOR INTERFACE CONNECTOR (PIC) or to the ELECTRICAL BOX.
- PRINTER ADAPTER CABLE TL-5004 to the INTERFACE CABLE TL-4391 and the PRINTER.

READY				
DRYER TEMP	SLEEP	SELECT CYCLE	MORE	**GO TO SETUP**

[2] Press [GO TO SETUP] from the main menu.

1	2	3	4	CANCEL REQUEST

[3] Enter the access code.

^	v	CYCLE	**MORE**	DONE/ RETURN

[4] Press [MORE].

INFO	SETUP	OPTIONS		DONE/ RETURN

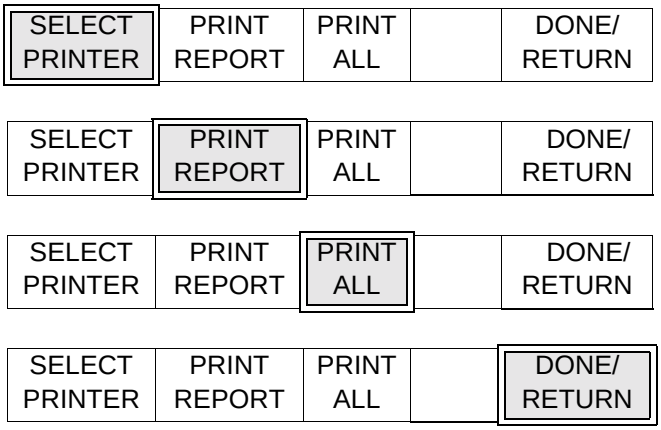
[5] Press [INFO].

USAGE	DIAG	SW VERSION	**MORE**	DONE/ RETURN

[6] Press [MORE] for additional options.

PROC HOURS	**PRINTER**		MORE	DONE/ RETURN

[7] Press [PRINTER] for additional options.

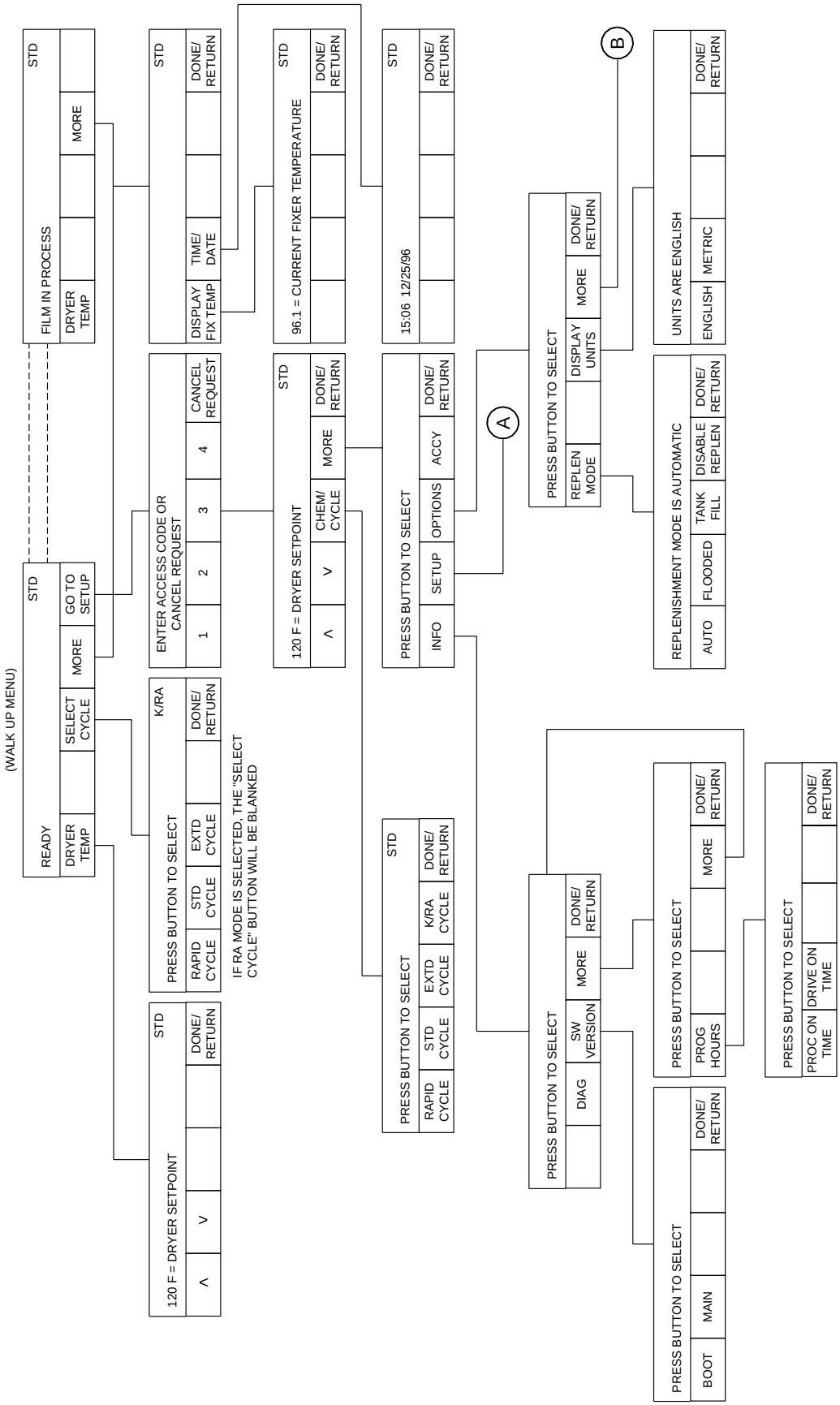


[8] From this screen, you can press:

- [SELECT PRINTER] to indicate the connection used in Step 1
  - PROCESSOR INTERFACE CONNECTOR (PIC)
  - ELECTRICAL BOX (EBOX)
- [PRINT REPORT] to select the reports you want to make
  - Status
  - Usage
  - Log
- [PRINT ALL] to print all the reports at once
- [DONE/RETURN] until you to return to the main menu

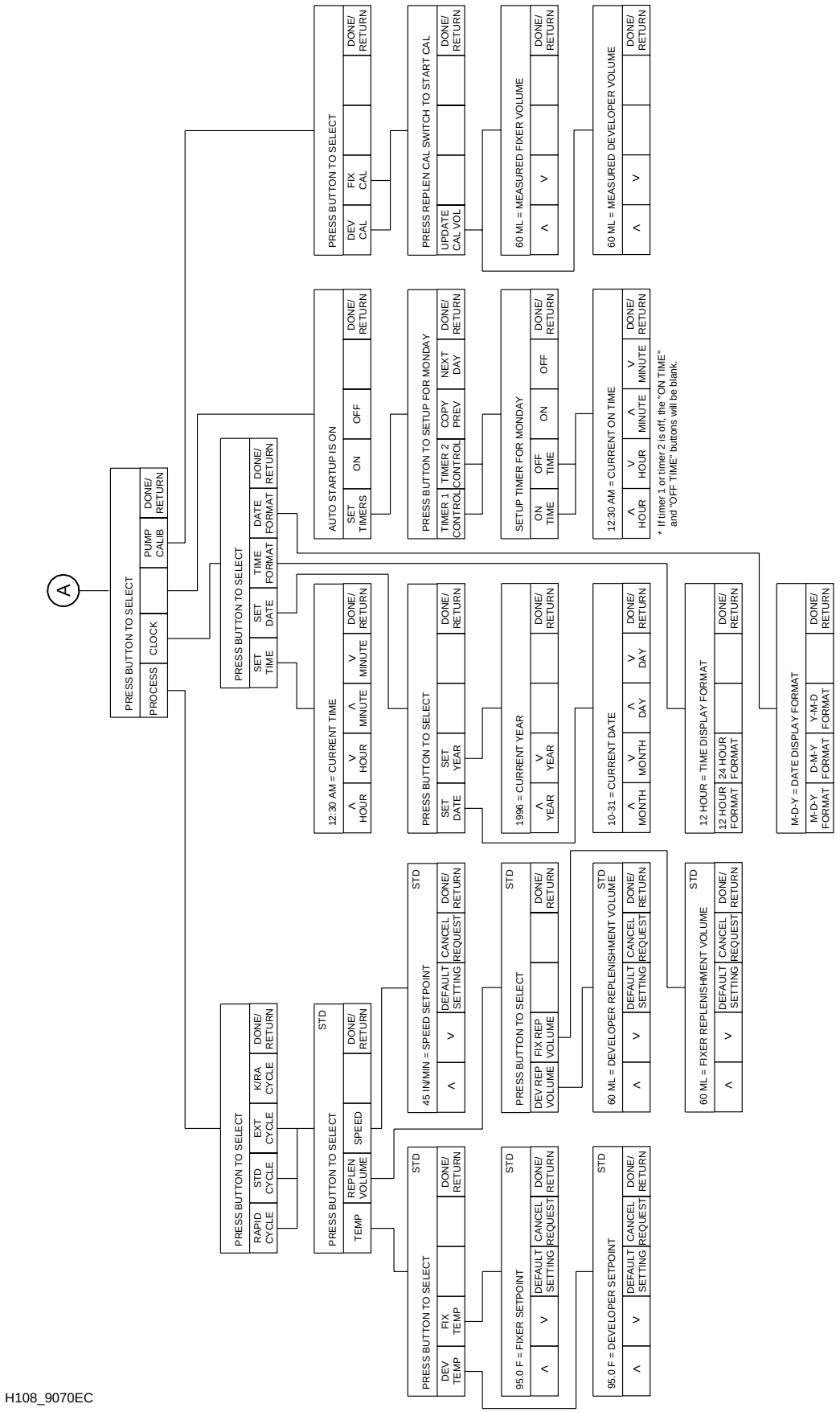
“Walk-up” Menus

Menu 1 of 3



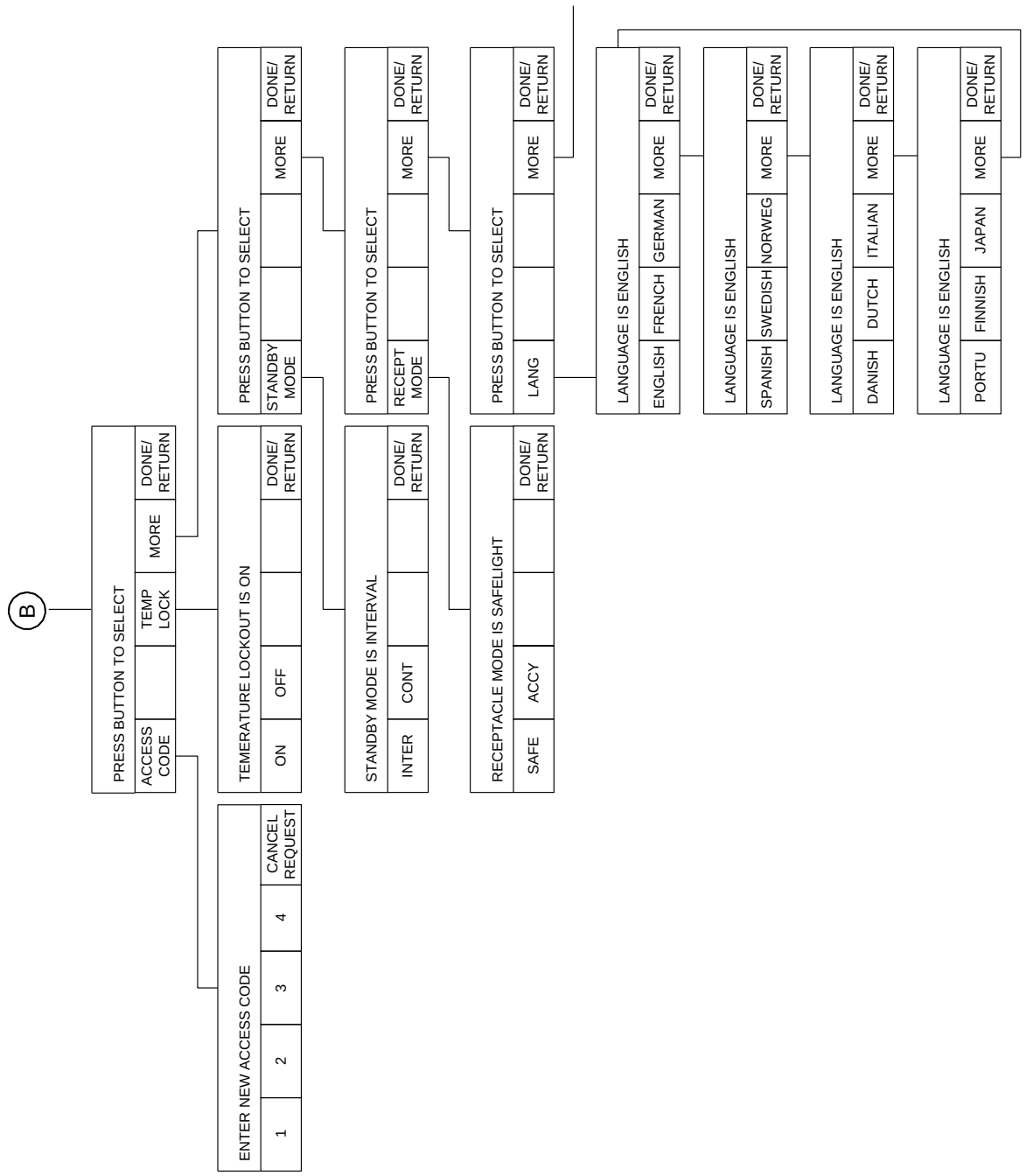
H108_9069EC

Menu 2 of 3



H108_9070EC

Menu 3 of 3



H108_9071EC

Error Codes for the 5000 BOARD in the PROCESSOR

Introduction

Overview

- The software on the 5000 MICROPROCESSOR BOARD controls and monitors the operation of the PROCESSOR and continually checks for errors. When an error occurs, a description of the error displays on the DISPLAY PANEL.
- When 2 or more errors occur together, all the errors are displayed, but only one error is visible on the DISPLAY PANEL at a time. The first error has the highest priority. You can move through the list to view the other errors.
- An error log on the 5000 BOARD records:
  - last 100 errors
  - number of times each error occurred
- The 3 types of errors are:
  - Fatal
  - Non-Fatal
  - Warning

Fatal and Non-Fatal Errors

Important

- Only qualified service personnel should repair fatal and non-fatal errors.
- When troubleshooting a PROCESSOR with a fatal or non-fatal error and checking an electrical component or BOARD, you must also check all:
  - connections for the component or the BOARD
  - voltages from the POWER SUPPLY for the component or the BOARD
- Fatal errors prevent optimum film processing.
- Most non-fatal errors do not prevent optimum film processing.

Warning Errors

Operators can repair warning errors. Normally, you can feed film into a PROCESSOR when a warning error is displayed.

READY LED

Important

- Do not process film when the LED is de-energized.
- If any error prevents optimum film processing, the READY LED will de-energize. When the LED de-energizes, you can feed film into the PROCESSOR, but the image quality might not be correct.

All Errors

Caution

- Possible damage from electrostatic discharge.
- When you check an electrical component or a BOARD, you must also check all:
  - connections and CABLES for the component or the BOARD
  - voltages from the POWER SUPPLY for the component or the BOARD

Fatal Errors

Code	Description	Possible Cause	Action
E001	The MICROCONTROLLER has an error.	The 5000 BOARD has a malfunction.	Install a new 5000 BOARD.
E002	The DRYER exceeds the maximum temperature	The DRYER BLOWER has a malfunction. **Note** When the DRYER HEATER energizes, the DRYER BLOWER should energize.	Check: • RELAY K8 • DRYER BLOWER
		The DRYER THERMISTOR has a malfunction.	Check that the resistance at 25°C (77°F) is approximately 10 KΩ.
		The SOLID STATE RELAY U1 (DS5) has a malfunction.	Check RELAY U1 for the correct operation. See "SOLID STATE RELAYS" on Page 30.
		The 5000 BOARD has a malfunction.	Install a new 5000 BOARD.
E003	The FILM ACCUMULATOR has no data connection.	The PROCESSOR has no communication with the 5600 BOARD.	De-energize and energize the PROCESSOR to automatically reset the MICROPROCESSOR on: • 5000 BOARD • 5600 BOARD
		The 5600 BOARD has the wrong PROM.	Install the newest PROM for the 5600 BOARD.
		The 5000 BOARD has a malfunction.	Install a new 5000 BOARD.
E004	A transport failure occurred.	See "E041" on Page 26.	
E005	• The DRYER OVER-TEMPERATURE THERMOSTAT is opened, or • No air flow is occurring in the DRYER. **Note** The DRYER HEATER and the DRYER BLOWER are disabled when this error occurs.	The DRYER OVER-TEMPERATURE THERMOSTAT has a malfunction.	1. Reset the THERMOSTAT. 2. Install a new THERMOSTAT. 3. If the THERMOSTAT opens again, determine the cause of the condition. See E002.
		The DRYER BLOWER has a malfunction.	Check: • RELAY K8 • DRYER BLOWER for correct operation
		The RELAY K5002 (DS7) has a malfunction.	1. Check for correct operation. 2. If the RELAYS on the 5000 BOARD: • can be removed, install a new RELAY K5002 • cannot be removed, install a new 5000 BOARD

Code	Description	Possible Cause	Action
E007	A failure occurred for the DEVELOPER THERMISTOR. **Note** The DEVELOPER HEATER is disabled when this error occurs.	The DEVELOPER THERMISTOR has a malfunction.	Install a new THERMISTOR.
E008	A failure occurred for the FIXER THERMISTOR. **Note** The FIXER HEATER is disabled when this error occurs.	The FIXER THERMISTOR has a malfunction.	Install a new THERMISTOR.
E009	A failure occurred for the DRYER THERMISTOR. **Note** The DRYER HEATER is disabled when this error occurs.	The DRYER THERMISTOR has a malfunction.	Install a new THERMISTOR.
E010	The conversion from an analog signal to a digital signal was not successful. **Note** All 3 HEATERS are disabled when this error occurs.	The POWER SUPPLY or the 5000 BOARD has a malfunction.	1. On the 5000 BOARD, check the voltages at the test points for the POWER SUPPLY. 2. If the voltages are not correct, install a new POWER SUPPLY. 3. If the problem continues, install a new 5000 BOARD.
E013	A circuit failure occurred for the LEVEL SENSOR. **Note** • This error occurs when the circuit on the 5000 BOARD for the LEVEL PROBE malfunctions. • The following parts are disabled: – DEVELOPER and FIXER REPLENISHMENT PUMPS – RECIRCULATION PUMP	The 5000 BOARD has a malfunction.	Install a new 5000 BOARD.

Code	Description	Possible Cause	Action
E014	The program software has a failure. **Note** • E014 displays on the DEVELOPER TEMPERATURE DISPLAY. • This error disables all subsystems, except communications.	The REPLENISHMENT CALIBRATION SWITCH has a malfunction.	1. Check the REPLENISHMENT CALIBRATION SWITCH for correct operation. 2. If necessary, install a new SWITCH.
		The main program software in the EPROM on the 5000 BOARD has a malfunction.	Download new software.
E015	The booting software has a failure.	The software for the PROM U5006 on the 5000 BOARD has a malfunction.	Install a new PROM U5006.

Non-Fatal Errors

Code	Description	Possible Malfunction	Action
E032	Developer TANK fill error One of the following conditions occurred: • DEVELOPER TANK – does not fill within 2 minutes during normal operation – does not fill within 10 minutes in the “Tank Fill” mode – is empty and the operator does not select the “Tank Fill” mode • REPLENISHMENT TANK is empty • REPLENISHMENT HOSE – has an obstruction – is bent – has an air bubble • TANKS in the PROCESSOR are filled with water during the first installation **Note** The following parts are disabled when this error occurs: • DEVELOPER REPLENISHMENT PUMP • RECIRCULATION PUMP • temperature control for the fixer and the developer	The TANKS in the PROCESSOR are filled with water during the first installation.	To prevent this error from occurring during the first installation: 1. Add 240 mL (8 fl oz) of developer to the DEVELOPER TANK before filling the PROCESSOR with water. 2. Energize the RECIRCULATION PUMP to move the developer and remove any air bubbles. **Note** Use the diagnostics to energize the PUMP.
		The operator does not select the “Tank Fill” mode when the DEVELOPER TANK is empty.	Ask the operator to: • select the “Tank Fill” mode • execute the operation again
		The LEVEL PROBES: • are dirty • have a malfunction	Clean and check the PROBES.
		The solution level in the REPLENISHER TANK is low.	Mix new developer solution.
		The solution does not flow through the HOSES between the REPLENISHMENT TANK and the REPLENISHMENT PUMP.	Check: • HOSE CLAMPS are tightened • HOSES – are round and opened – have no obstructions or air bubbles
		The DEVELOPER DRAIN VALVE is opened.	Close the VALVE.
		The SOLID STATE RELAY U3 (DS3) has a malfunction.	Check for correct operation of the RELAY U3. See “SOLID STATE RELAYS” on Page 30.
		The POPPET VALVES in the DEVELOPER REPLENISHMENT PUMP: • are dirty • have a malfunction	Clean and check the VALVES.
		The DEVELOPER REPLENISHMENT PUMP has a malfunction.	Check: • FUSE F1 • REPLENISHMENT PUMP MOTOR B4

Code	Description	Possible Malfunction	Action
E033	The FIXER TANK has a filling error. One of the following conditions occurred: • FIXER TANK – does not fill within 2 minutes during normal operation – does not fill within 5 minutes in the “Tank Fill” mode – is empty and the operator does not select the “Tank Fill” mode • REPLENISHMENT TANK is empty • REPLENISHMENT HOSE – has an obstruction – is bent – has an air bubble • TANKS in the PROCESSOR are filled with water during the first installation **Note** The following parts are disabled when this error occurs: • FIXER REPLENISHMENT PUMP • RECIRCULATION PUMP • temperature control for the fixer and the developer	The TANKS in the PROCESSOR are filled with water during the first installation.	To prevent the error from occurring during the first installation: 1. Add 240 mL (8 fl oz) of fixer to the FIXER TANK before filling the PROCESSOR with water. 2. Energize the RECIRCULATION PUMP to move the fixer and remove any air bubbles. **Note** Use the diagnostics to energize the PUMP.
		The operator does not select the “Tank Fill” mode when the FIXER TANK is empty.	Ask the operator to: • select the “Tank Fill” mode • execute the operation again
		The LEVEL PROBES: • are dirty • have a malfunction	Clean and check the PROBES.
		The solution level in the REPLENISHER TANK is low.	Mix new fixer solution.
		The solution does not flow through the HOSES between the REPLENISHMENT TANK and the REPLENISHMENT PUMP.	Check: • HOSE CLAMPS are tight • HOSES – are round and opened – have no obstructions or air bubbles
		The FIXER DRAIN VALVE is opened.	Close the VALVE.
		The SOLID STATE RELAY U4 (DS2) has a malfunction.	Check for the correct operation of RELAY U4. See “SOLID STATE RELAYS” on Page 30.
		The POPPET VALVES in the FIXER REPLENISHMENT PUMP: • are dirty • have a malfunction	Clean and check the VALVES.
		The FIXER REPLENISHMENT PUMP has a malfunction.	Check: • FUSE F1 • REPLENISHMENT PUMP MOTOR B4

Code	Description	Possible Malfunction	Action
E037	The developer heating operation has a failure. **Note** When the DEVELOPER HEATER HR3 is excessively hot, the OVER-TEMPERATURE THERMOSTAT opens.	The DEVELOPER HEATER HR3 has a malfunction.	1. Wait until: • DEVELOPER HEATER cools • OVER-TEMPERATURE THERMOSTAT resets 2. Check the DEVELOPER HEATER HR1 for approximately 50Ω resistance at 20°C (70°F).
		The SOLID STATE RELAY U2 (DS4) has a malfunction.	Check RELAY U2 for correct operation. See “SOLID STATE RELAYS” on Page 30.
		The RELAY K5004 (DS9) has a malfunction.	1. Check the RELAY K5004 for correct operation. 2. If the RELAYS on the 5000 BOARD: • can be removed, install a new RELAY K5004 • cannot be removed, install a new 5000 BOARD
		The RECIRCULATION PUMP has a malfunction.	1. Check: • voltage to the RECIRCULATION PUMP MOTOR B5 • for the correct operation of the RECIRCULATION PUMP 2. If necessary, install a new RECIRCULATION PUMP.
		The DEVELOPER COOLING SOLENOID L2 has a malfunction.	1. Check that the SOLENOID L2 stops the developer flow through the HEAT EXCHANGER. 2. If necessary, install a new SOLENOID L2.

Code	Description	Possible Malfunction	Action
E038	The developer cooling operation has a failure.	Water does not enter the WASH TANK.	Check: • water is provided to the PROCESSOR • water supply is on • FILTER is clean • INPUT WASH SOLENOID L1 is correct • SCREEN has no obstructions • DEVELOPER COOLING SOLENOID L2 • QUICK DISCONNECT is connected
		The temperature of the water entering the WASH TANK is too hot. **Note** The wash water must be a minimum of 5.5°C (10°F) less than the set point of the developer.	Decrease the temperature of the water supply.
		The HEAT EXCHANGER in the WASH TANK has an obstruction.	Remove any obstructions from the EXCHANGER.
		The 5000 BOARD does not energize SOLENOID L1 or de-energize SOLENOID L2.	1. Check that the correct LED on the 5000 BOARD is energized: • DS15 for L1 • DS14 for L2 2. Check for 24 V DC at TERMINALS 1 and 2 on: • WASH WATER SOLENOID L1 • DEVELOPER COOLING SOLENOID L2 3. If necessary, install a new 5000 BOARD.
		The RECIRCULATION PUMP has AC power, but the PUMP does not operate.	1. Check the RECIRCULATION PUMP MOTOR B5. 2. If necessary, install a new PUMP.
		The RECIRCULATION PUMP does not have AC power.	If the RELAYS on the 5000 BOARD: • can be removed, install a new RELAY K5003 • cannot be removed, install a new 5000 BOARD

Code	Description	Possible Malfunction	Action
E039	The fixer heating operation has a failure. **Note** When the FIXER HEATER HR2 is excessively hot, the OVER-TEMPERATURE THERMOSTAT opens.	The FIXER HEATER HR4: • is opened • has a short circuit • has a resistance malfunction	1. Wait until: • DEVELOPER HEATER cools • OVER-TEMPERATURE THERMOSTAT resets 2. Check the FIXER HEATER HR4 for: • malfunction • short circuit • approximately 36Ω resistance at 20°C (70°F)
		The SOLID STATE RELAY U5 (DS1) has a malfunction.	Check for the correct operation of RELAY U5. See “SOLID STATE RELAYS” on Page 30.
		The RELAY K5004 (DS9) has a malfunction.	1. Check the RELAY K5004 for correct operation. 2. If the RELAYS on the 5000 BOARD: • can be removed, install a new RELAY K5004 • cannot be removed, install a new 5000 BOARD
		The RECIRCULATION PUMP has a malfunction.	Check: • for correct operation of MOTOR B5 • FUSE F1
E040	The heating operation for the DRYER has a failure.	A PANEL is not installed.	Install the PANEL.
		The BLOWER MOTOR has a malfunction.	1. Check the BLOWER DRIVE BELT. 2. Adjust or install a new BELT. 3. Check the operation of the BLOWER MOTOR.
		The DRYER OVER-TEMPERATURE THERMOSTAT has a malfunction.	1. Reset the THERMOSTAT. 2. If the THERMOSTAT opens again, determine the cause of the high temperature. 3. If you cannot determine the cause of the problem, install a new THERMOSTAT.
		SOLID STATE RELAY U1 (DS5)	Check RELAY U1 for correct operation. See “SOLID STATE RELAYS” on Page 30.
		The DRYER HEATER does not have continuity.	Check that the resistance is approximately 14 - 21Ω.

Code	Description	Possible Malfunction	Action
E041	The transport does not have speed control. **Note** • This error occurs when the transport speed is adjusted for 10 seconds and the speed each minute is not within 7.6 cm (3 in.) of the set point. • When the PROCESSOR operates normally, the supply voltage from the +24 V POWER SUPPLY PS3 to the “PCOM” and +24 V TERMINALS of the DRIVE MOTOR CONTROLLER A2 is 24 V DC. • The voltage can change from one PROCESSOR to another PROCESSOR. • Feedback pulses from the DRIVE MOTOR CONTROLLER at TEST POINT “MOTFB” on the 5000 BOARD indicate the speed of the DRIVE MOTOR. • If the transport operates slower than the set speed, the MICROPROCESSOR increases the control voltage approximately 25 mV each second at TERMINALS 4 and 6 on the DRIVE MOTOR CONTROLLER A4 on the 5000 BOARD. • If the voltage reaches 5 V DC, the MICROPROCESSOR stops increasing the voltage.	The 5000 BOARD has a malfunction of the control voltage.	1. Check the control voltage at TERMINALS 4 and 6 of the DRIVE MOTOR CONTROLLER A4. The voltage measurements should be approximately: • 2.0 V DC for the Extended Speed • 3.2 V DC for the Standard Speed • 4.2 V DC for the Rapid Speed • 5.4 V DC for the K/RA Speed 2. If the control voltage is not correct at TEST POINT “MOTDRV” on the 5000 BOARD, install a new BOARD.
	A malfunction occurred in: • DC DRIVE MOTOR B6 • DRIVE MOTOR CONTROLLER A2	1. Check at TEST POINT “MOTFB” on the 5000 BOARD for pulses from MOTOR B6 during operation. 2. Check the supply voltage and the control voltage to the DRIVE MOTOR CONTROLLER A2. 3. If MOTOR B6 operates, but no pulses occur at TEST POINT “MOTFB” or the voltage is not correct, check: • MOTOR B6 • CONTROLLER A2	

Code	Description	Possible Malfunction	Action
E043	The STATIC RAM BATTERY has a failure.	The RAM energized by the BATTERY has errors. The cycle default values are loaded into the cycle process parameters. When the PROCESSOR is de-energized, the RAM does not keep any changed data.	1. Install a new CLOCK/MEMORY MODULE U21. 2. Enter any special process parameters or set points.
E045	A display data connection error occurred.	The CABLES between the 350 BOARD and the 5000 BOARD are: • damaged • not connected correctly	Check the CABLES.

Warnings

Code	Description	Possible Cause	Action
E128	The TOP COVER is not in the correct position. **Note** When this error occurs, the following functions are disabled: • film transport • film collection	The TOP COVER is opened.	Close the TOP COVER.
		• The INTERLOCK SWITCH S3 or INTERLOCK SWITCH S4 has a malfunction. • The MAGNET for an INTERLOCK SWITCH has a malfunction	1. Check SWITCH S3 and SWITCH S4. 2. If necessary, install a new SWITCH or MAGNET.
E129	The TANKS are filling. **Note** The following components are disabled when this error occurs: • FILM TRANSPORT • FILM ACCUMULATION • RECIRCULATION PUMP • 3 HEATERS	None	None. This message clears automatically.
E130	The REPLENISHMENT PUMPS are disabled.	None	Use the KEYPAD to select either Automatic or “Flooded” Replenishment to enable the PUMPS.
E132	The developer is below the set point temperature	None	None. This message clears automatically when the developer reaches the set point temperature.
E133	The developer is above the set point temperature	None	
E134	The DRYER is below the set point temperature.	None	None. This message clears automatically when the DRYER reaches the set point temperature.
E137	The film collection LED has an error.	The 5600 BOARD has a malfunction.	1. Check that no chemical artifacts are on the PROTECTIVE COVER for the 5000 BOARD. 2. Reset the MICROPROCESSOR on the 5000 BOARD or the 5600 BOARD: • De-energize the PROCESSOR. • Energize the PROCESSOR. 3. Check the 5600 BOARD. Use the internal diagnostics. 4. If necessary, install a new 5600 BOARD.

Code	Description	Possible Cause	Action
E141	The quantity of developer solution in the DEVELOPER TANK is too low. **Note** When this error occurs: • RECIRCULATION PUMP is disabled • temperature control for the fixer and the developer is disabled	None	This error clears automatically when the developer solution reaches the correct quantity.
E142	The quantity of fixer solution in the FIXER TANK is too low. **Note** When this error occurs: • RECIRCULATION PUMP is disabled • temperature control for the fixer and the developer is disabled	None	This error clears automatically when the fixer solution reaches the correct quantity.

Troubleshooting

SOLID STATE RELAYS

Theory

SOLID STATE RELAYS (SSRs) are used in the PROCESSORS to control HEATER loads that change from ON to OFF a number of times each minute. The SSRs are more reliable than other electrical and mechanical RELAYS. SSRs have the additional benefit of a decreased current requirement for the control voltage.

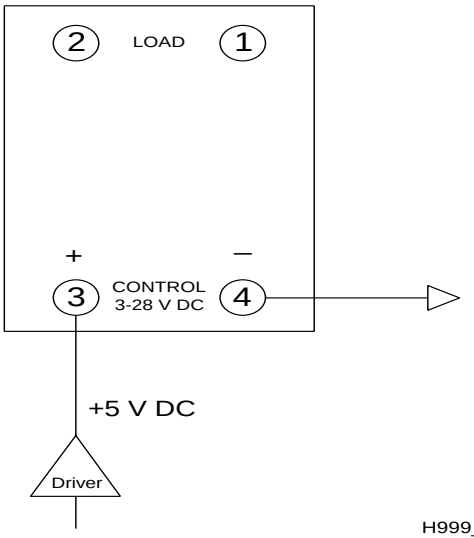
SSRs are used in 2 types of PROCESSORS.

- Older PROCESSORS, including the *Kodak* RP *X-Omat* PROCESSOR, MODELS M6B/ M7B, the *Kodak X-Omat* 2000 PROCESSOR, and the *Kodak Min-R* MAMMOGRAPHY PROCESSOR use an SSR to apply a 12 V DC signal to the control side of the RELAY to energize the load for the AC HEATER.
- The *Kodak X-Omat* 180 LP PROCESSOR and the *Kodak X-Omat* 270/3000/5000 RA PROCESSORS that use a +5 V DC control signal use the RELAY to control large loads on the HEATER with low voltage DC signals.

The differences between the 2 applications are:

- value of the control signal
- procedure to apply the control signal to the RELAY

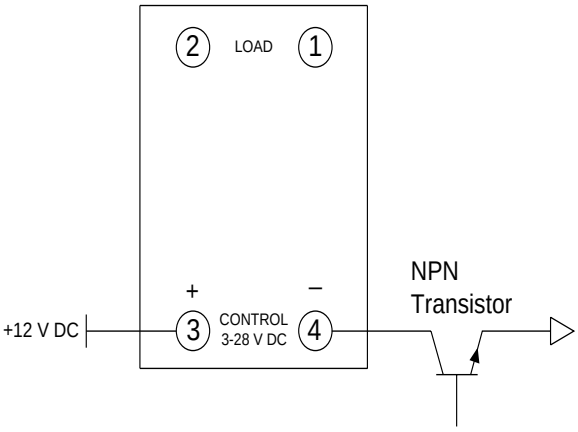
RA PROCESSORS



H999_0033AC_

In RA PROCESSORS, the negative TERMINAL is permanently connected to the ground. The RELAY is energized when +5 V DC is applied to the positive TERMINAL. This +5 V DC is from an INTEGRATED CIRCUIT DRIVER located on the 500 BOARD or the 5000 BOARD. If a DC meter is placed across the control TERMINALS, the RELAY is ON if +5 V DC, with a voltage from 3 - 5 V DC, is measured from the positive to the negative TERMINALS. These measurements must be made across the TERMINALS.

Other PROCESSORS



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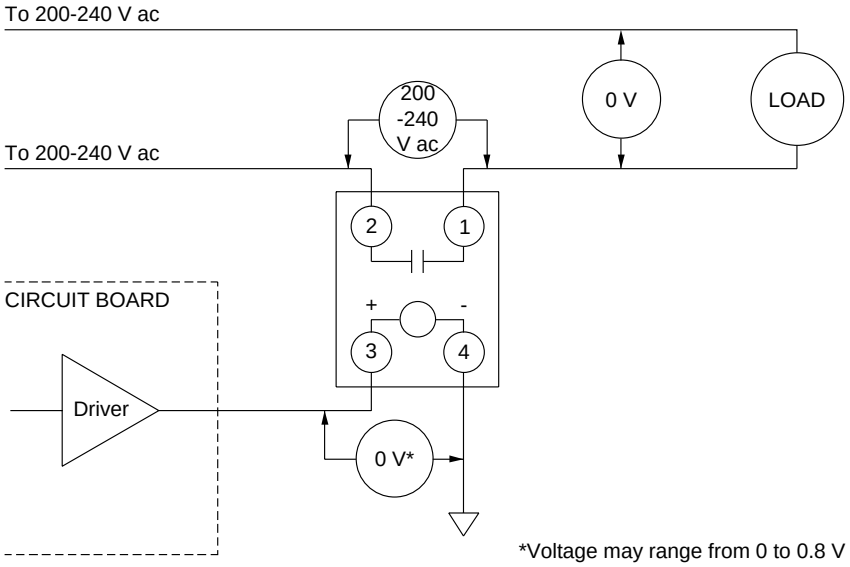
In other PROCESSORS, 12 V DC is applied to the positive, or +, TERMINAL of the SSR and the RELAY actuates by changing the negative, or -, TERMINAL to ground. If a DC meter is placed across the control TERMINALS, the RELAY is ON if +12 V DC, with a voltage from 9 - 12 V DC, is measured from the positive to the negative TERMINALS. These measurements must be made across the TERMINALS.

Normal Voltages for the OFF Mode

Important

- Normal circuits:
  - are in the ON and OFF modes
  - are checked with a VOLTMETER
  - have normal voltage applied
- The indicated “normal” voltage values are approximate.
- Voltage controls for the RELAYS, including SOLID STATE RELAYS, are complex.



*Voltage may range from 0 to 0.8 V dc.

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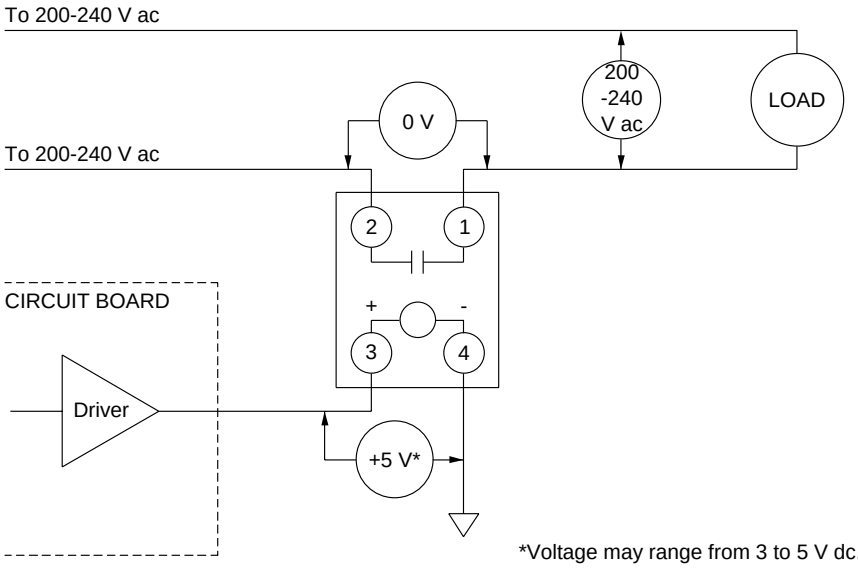
Normal Voltages for the ON Mode



*Voltage may range from 3 to 5 V dc.

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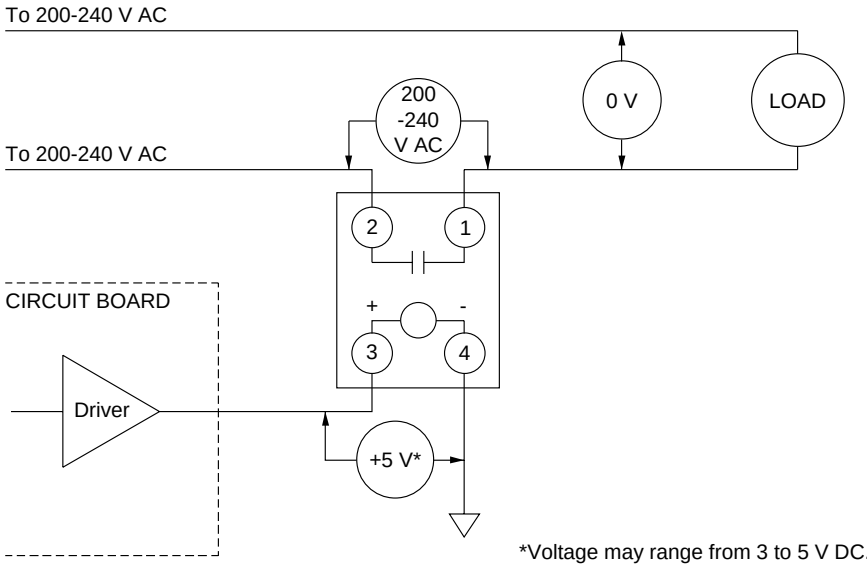
Open Circuit Voltages



*Voltage may range from 3 to 5 V DC.

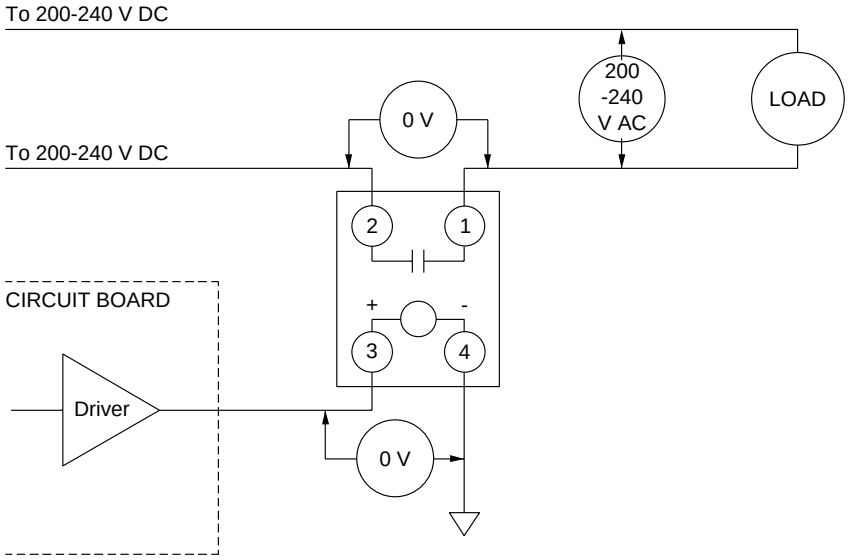
H999_0036BC_

Note

When the SOLID STATE RELAY has an open circuit:

- The load is not ON at any time.
- The control voltage is 5 V DC across PINS 3 and 4.
- The RELAY does not energize.

Short Circuit Voltages



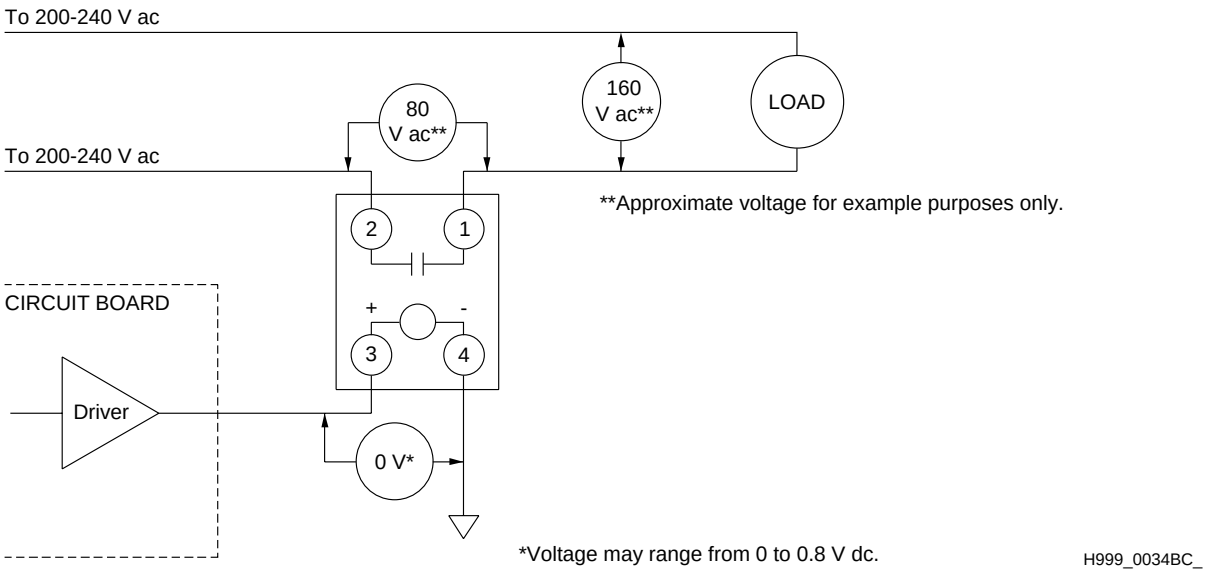
H999_0037BC_

Note

When the SOLID STATE RELAY has a short circuit:

- The load is
  - energized
  - ON continually
- The control voltage does not occur.
- The voltage is 0 V DC across PINS 3 and 4.

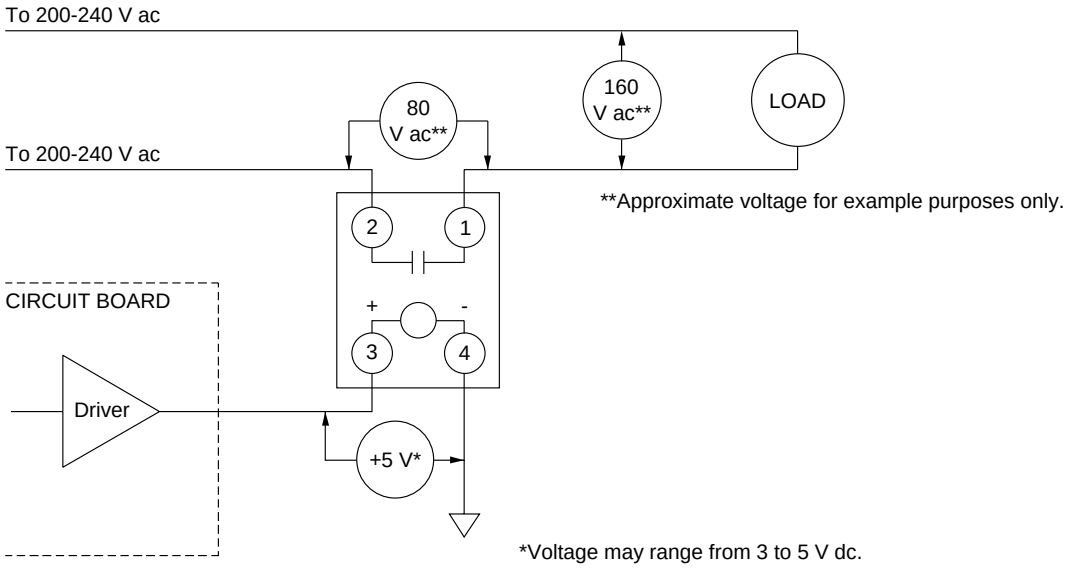
Half-Wave Short Circuit Voltages with Control Voltage OFF



Note

- When the SOLID STATE RELAY has a half-wave short circuit:
  - The load is partially ON.
  - Without the control voltage, the voltage is 0 V across PINS 3 and 4.
  - The load has low voltage power provided.
  - The SOLID STATE RELAY has a short circuit and sends half-wave rectified AC voltage to the load.
  - The VOLTMETER indicates a voltage between 240 V AC and 0 V across the load.
- When logic actuates the SOLID STATE RELAY, the load operates normally.

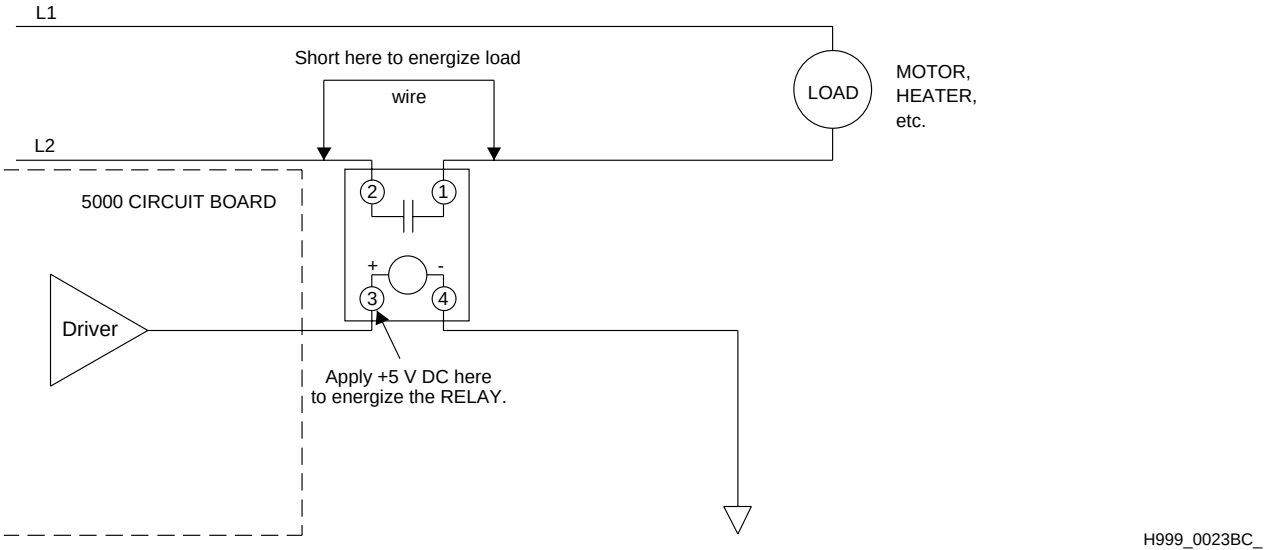
Half-Wave Open Circuit Voltages with Control Voltage ON



Note

- When the SOLID STATE RELAY has a half-wave open circuit:
  - ½ of the SOLID STATE RELAY is not ON at any time
  - ½ of the SOLID STATE RELAY is ON when it is controlled
  - The signal from the 5000 BOARD actuates the RELAY.
  - The voltage is 5 V DC across PINS 3 and 4.
  - The load has only low voltage power from the open circuit of ½ of the RELAY.
  - Half-wave rectified AC voltage is provided to the load.
  - The VOLTMETER indicates a voltage between 240 V AC and 0 V across the load when the RELAY is energized.
- In this condition, ½ of the SOLID STATE RELAY is OFF.

Wire Test



Before doing a replacement of parts, do these tests to locate the problem. The 3 options are:

- Control voltage is provided. The SOLID STATE RELAY has a response, but the load does not operate.
  - **Result:** A failure has occurred in the load, the MOTOR, the HEATER, or other parts.
- Control voltage is provided, but the SOLID STATE RELAY is not conducting.
  - **Result:** A failure has occurred in the SOLID STATE RELAY.
- The 5000 BOARD does not provide the control voltage at the correct time.
  - **Result:** A failure has occurred on the 5000 BOARD.

THERMISTORS - Temperature and Resistance Values

Use the values in the following table to check the operation of:

- DEVELOPER THERMISTOR
- FIXER THERMISTOR
- DRYER THERMISTOR

Temperature		Resistance	Temperature		Resistance
Degrees C	Degrees F	Ohms	Degrees C	Degrees F	Ohms
10.0	50.0	19898.3	44.0	111.2	4543.9
12.0	53.6	18087.6	46.0	114.8	4200.8
14.0	57.2	16460.9	48.0	118.4	3889.5
16.0	60.8	14997.7	50.0	122.0	3603.1
18.0	64.4	13679.8	52.0	125.6	3340.6
20.0	68.0	12491.6	54.0	129.2	3099.6
22.0	71.6	11418.9	56.0	132.8	2878.5
24.0	75.2	10449.5	58.0	136.4	2675.2
25.0	77.0	10000.0	60.0	140.0	2488.2
26.0	78.8	9572.3	62.0	143.6	2316.1
28.0	82.4	8777.8	64.0	147.2	2157.4
30.0	86.0	8057.3	66.0	150.8	2011.2
32.0	89.6	7403.3	68.0	154.4	1876.2
34.0	93.2	6808.4	70.0	158.0	1751.7
35.0	95.0	6531.3	72.0	161.6	1636.3
36.0	96.8	6265.8	74.0	165.2	1529.8
38.0	100.4	5776.1	76.0	168.8	1430.9
40.0	104.0	5327.3	78.0	172.4	1339.7
42.0	107.6	4917.9	80.0	176.0	1255.1

Transport Components

RACKS and CROSSOVERS - Checkout

[1] Check:

- RACKS and CROSSOVERS are seated and installed correctly
- for squareness of the RACKS and CROSSOVERS
- RACKS and CROSSOVERS are cleaned in all areas

ROLLERS - Checkout

[1] Check:

- ROLLERS are in the correct position and are rotating freely
- ROLLER GEARS, SPROCKETS, and IDLERS are engaged

[2] Install new ROLLERS if:

- ROLLERS are broken
- GUDGEONS have wear

[3] If any BEARINGS have wear, install new BEARINGS.

[4] If any SPRINGS or E-RINGS are broken, install new SPRINGS or E-RINGS.

[5] Adjust the tension on the RACK CHAIN allowing the ROLLERS to operate smoothly.

DRYER - Checkout

[1] Check:

- DRYER AIR TUBES are in the correct positions
- DRYER TEMPERATURE CONTROL KNOB is set to the lowest possible temperature that allows the film to dry
- DRYER DRIVE BELT is:
  - straight
  - in position in the center of the PULLEY
- INTERNAL EXHAUST FAN operates

Miscellaneous - Checkout

[1] Check that the TOP COVER is closed.

Surface Artifacts or Non-Normal Densities

Replenishment - Checkout

[1] Check:

- replenishment rates are set for correct replenishment
- replenishment calibration is correct
- TUBING of the REPLENISHMENT SYSTEM is not bent
- REPLENISHMENT PUMP is operating
- HOSE CLAMPS are tightened
- LEVEL SENSOR PROBES and CONNECTORS are cleaned

[2] Change any chemicals that were not mixed correctly, are empty, or are contaminated.

[3] When mixing chemicals, the following procedures are recommended:

- Mix a maximum of a 2 week supply of DEVELOPER REPLENISHER.
- Mix all chemicals and solutions. See the instructions and information with the materials.
- Prevent contamination of the developer. Use a SPLASH GUARD and DRIP TRAY when removing the FIXER RACK from the PROCESSOR.

[4] Fill the REPLENISHER TANKS if the solution levels are low.

[5] Check:

- DRAIN VALVES are closed
- TANKS are full

Recirculation - Checkout

[1] Check that the ORIFICES in the DEVELOPER RECIRCULATION HOSE and the FIXER RECIRCULATION HOSE are not blocked.

[2] Install a new DEVELOPER FILTER.

[3] With the PROCESSOR energized and the processing TANKS full, check for motion of the solutions at the surface of the TANKS. Motion indicates recirculation. If no motion is observed, check:

- TUBING for the RECIRCULATION SYSTEM is not bent
- PUMP is operating
- DEVELOPER FILTER is in the correct position

RACKS and CROSSOVERS - Checkout

[1] Check:

- RACKS and CROSSOVERS are:
  - in the correct position
  - clean
- RACKS are correctly seated

ROLLERS - Checkout

[1] Check that the surfaces of all ROLLERS are clean and smooth. Use special care in the DEVELOPER RACK and CROSSOVERS.

[2] Remove debris from the DETECTOR ROLLERS.

[3] Check:

- CROSSOVER GUIDE SHOES are clean
- ROLLERS are:
  - in the correct position
  - rotating freely
- ROLLER GEARS, SPROCKETS, and IDLERS are engaged

[4] Install new ROLLERS if:

- ROLLERS are broken
- GUDGEONS have wear

[5] If any BEARINGS have wear, install new BEARINGS.

[6] If any SPRINGS or E-RINGS are broken, install new SPRINGS or E-RINGS.

[7] Adjust the tension on the RACK CHAIN so that the ROLLERS operate smoothly.

DRYER - Checkout

[1] Check that the DRYER AIR TUBES are in the correct positions.

[2] Remove debris from the DRYER AIR TUBES and the SLOTS in the DRYER AIR TUBES.

[3] Clean the AIR TUBES. Use the BOTTLE BRUSH TL-4833.

[4] Rinse the AIR TUBES with water.

[5] Adjust the CONTROL KNOB for the DRYER TEMPERATURE to the lowest temperature that allows the film to dry.

Miscellaneous - Checkout

[1] Check:

- temperature of the entering water is between 4 - 32°C (40 - 90°F)
- TOP COVER is closed
- ACCESS PANELS are installed on the PROCESSOR
- no leakage of light occurs through the LIGHT-TIGHT GASKET on the PRINTER DOCKING ASSEMBLY
- for flow of wash water
- WET SECTION COVER is in the correct position
- EXHAUST HOSE is:
  - connected
  - venting correctly

“Wet” Films

Replenishment - Checkout

[1] Check:

- replenishment rates are set for correct replenishment
- replenishment calibration is correct
- TUBING of the REPLENISHMENT SYSTEM is not bent
- REPLENISHMENT PUMP is operating
- HOSE CLAMPS are tightened
- LEVEL SENSOR PROBES and CONNECTORS are clean

[2] Change any chemicals that were not mixed correctly, are empty, or are contaminated.

[3] When mixing chemicals, the following procedures are recommended:

- Mix a maximum of a 2 week supply of DEVELOPER REPLENISHER.
- Mix all chemicals and solutions. See the instructions and information with the materials.
- Prevent contamination of the developer. Use a SPLASH GUARD and DRIP TRAY when removing the FIXER RACK from the PROCESSOR.

[4] Fill the REPLENISHER TANKS if the solution levels are low.

[5] Check:

- DRAIN VALVES are closed
- TANKS are full

Recirculation - Checkout

[1] With the PROCESSOR energized and the TANKS full, check for motion of the solutions at the surface of the processing TANKS. Motion indicates flow.

[2] If no motion is observed, check:

- TUBING of the recirculation system does not have obstructions or binds
- RECIRCULATION PUMP is operating
- DEVELOPER FILTER is installed correctly

DRYER - Checkout

[1] Check that the DRYER AIR TUBES are in the correct positions.

[2] Remove debris from the DRYER AIR TUBES and the SLOTS in the DRYER AIR TUBES.

[3] Using the BOTTLE BRUSH TL-4833, clean the AIR TUBES.

[4] Rinse the AIR TUBES with water.

[5] Adjust the CONTROL KNOB for the DRYER TEMPERATURE to the lowest temperature that allows the film to dry.

[6] Check:

- DRYER AIR EXHAUST is:
  - free from obstruction
  - installed within the specifications
- DRYER HEATER is operating

Wash Water - Checkout

[1] Check for the flow of wash water onto the ROLLERS on the WASH RACK.

Solution Levels

Replenishment - Checkout

[1] Check:

- replenishment rates are set for correct replenishment
- replenishment calibration is correct
- TUBING of the REPLENISHMENT SYSTEM is not bent
- REPLENISHMENT PUMP is operating

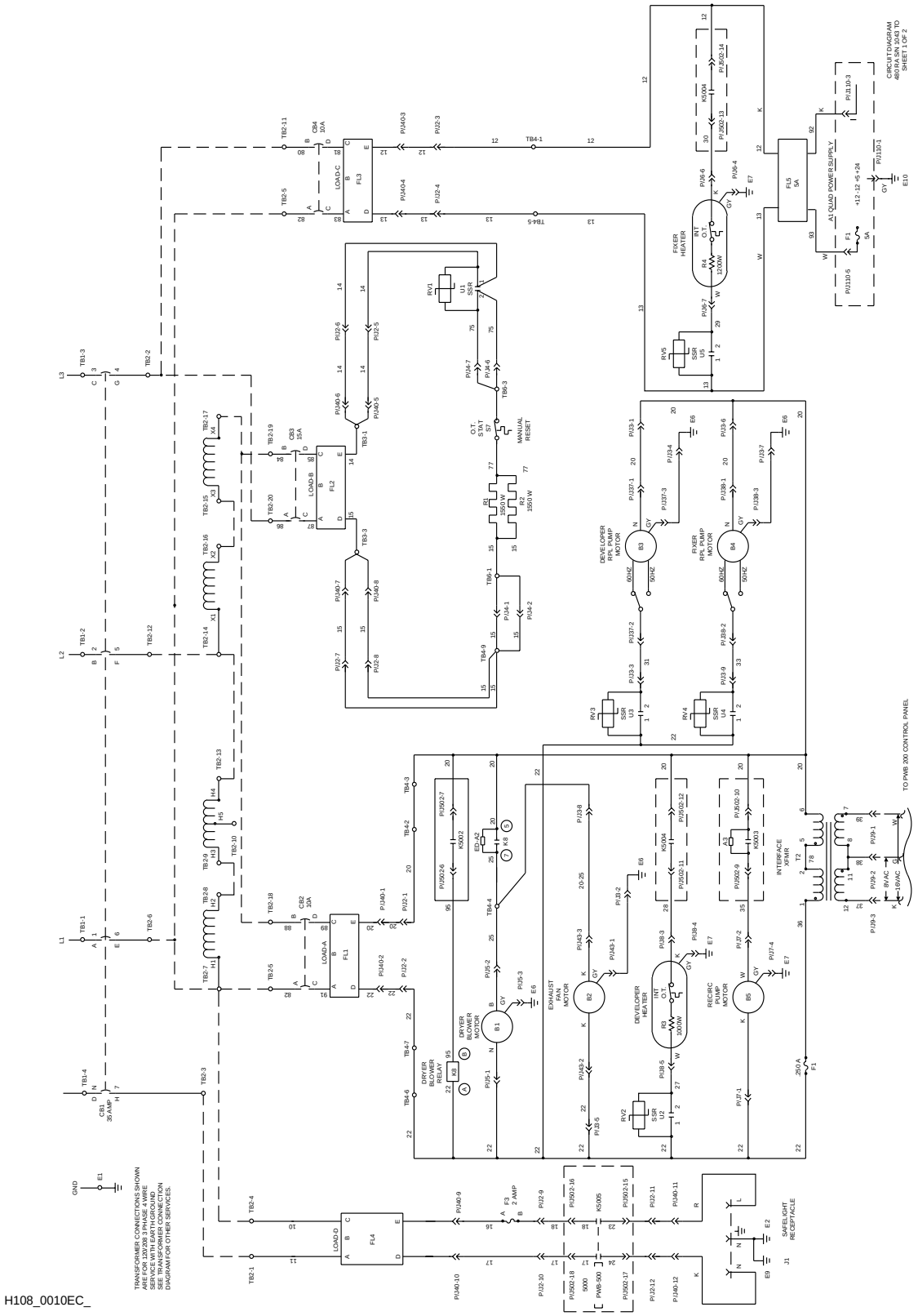
[2] Fill the REPLENISHER TANKS if the solution quantities are low.

[3] Check:

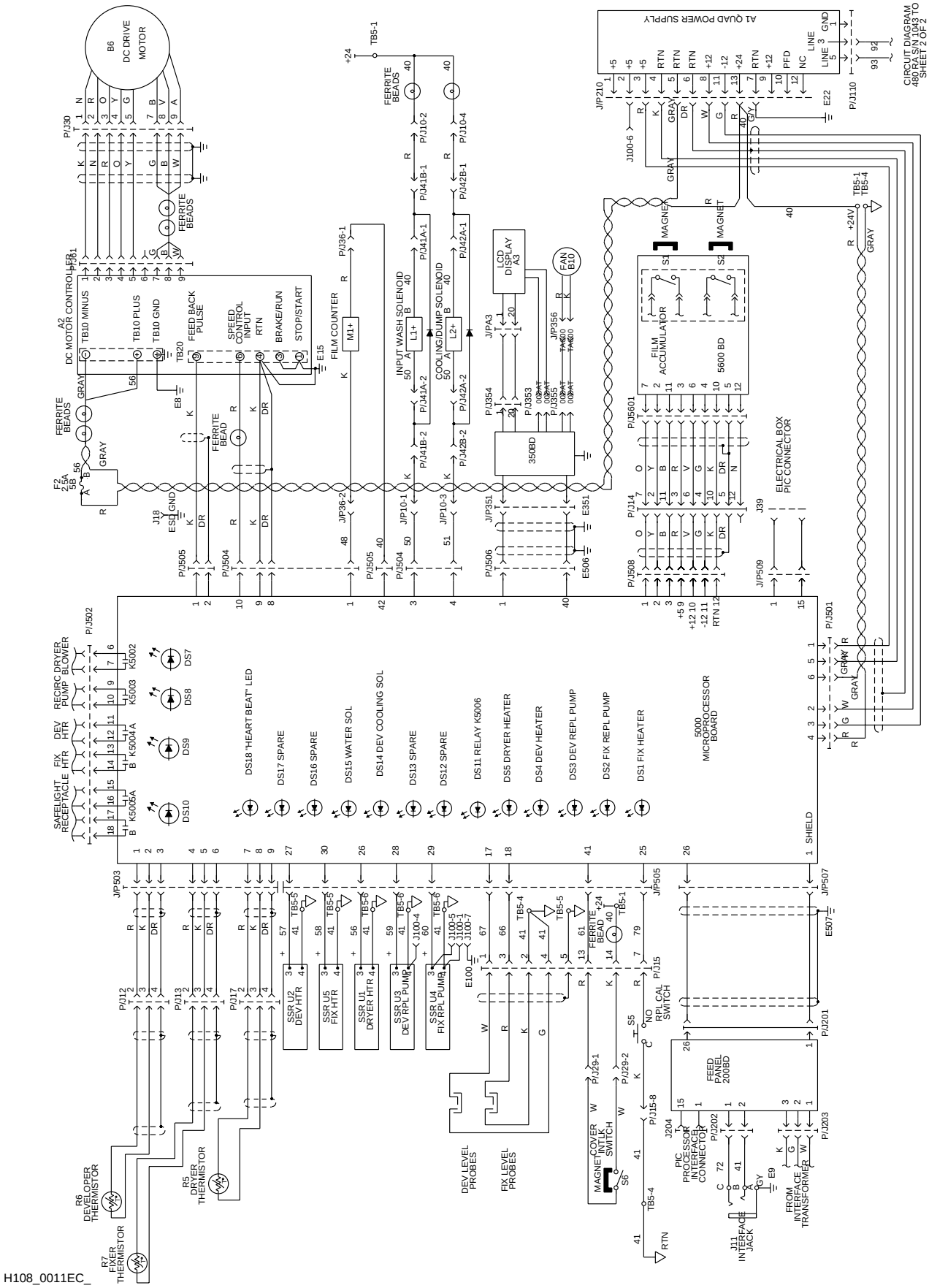
- POPPET SEATS:
  - are not dirty
  - have no distortion that prevents correct replenishment
- LEVEL PROBES and SPRING SPADES are:
  - clean
  - free from debris
- TUBING and HOSES:
  - are not bent
  - have no air bubbles
- DRAIN VALVES for leakage

Section 3: Diagrams

AC Diagram for a 5000 BOARD Installed in the PROCESSOR


H108_0010EC_
TRANSFORMER CONNECTIONS SHOWN ARE FOR 208/230 VOLT LINE SERVICE WITH EARTH GROUND. SEE TRANSFORMER CONNECTION DIAGRAM FOR OTHER SERVICES.
CIRCUIT DIAGRAM 480 RA SN 1043 TO SHEET 1 OF 2
TO PWB 200 CONTROL PANEL
A1 QUAD POWER SUPPLY
DEVELOPER RPL PUMP MOTOR
FIXER RPL PUMP MOTOR
DEVELOPER HEATER
FIXER HEATER
EXHAUST AIR MOTOR
RECIRC FILTER MOTOR
DRYER BLOWER MOTOR
INTERFACE XFMR
SAFELIGHT RECEPTACLE
MANUAL RESET
PWB-5000

DC Diagram for a 5000 BOARD Installed in the PROCESSOR



Section 4: Illustrated Parts List

Figure 1 5000 BOARD

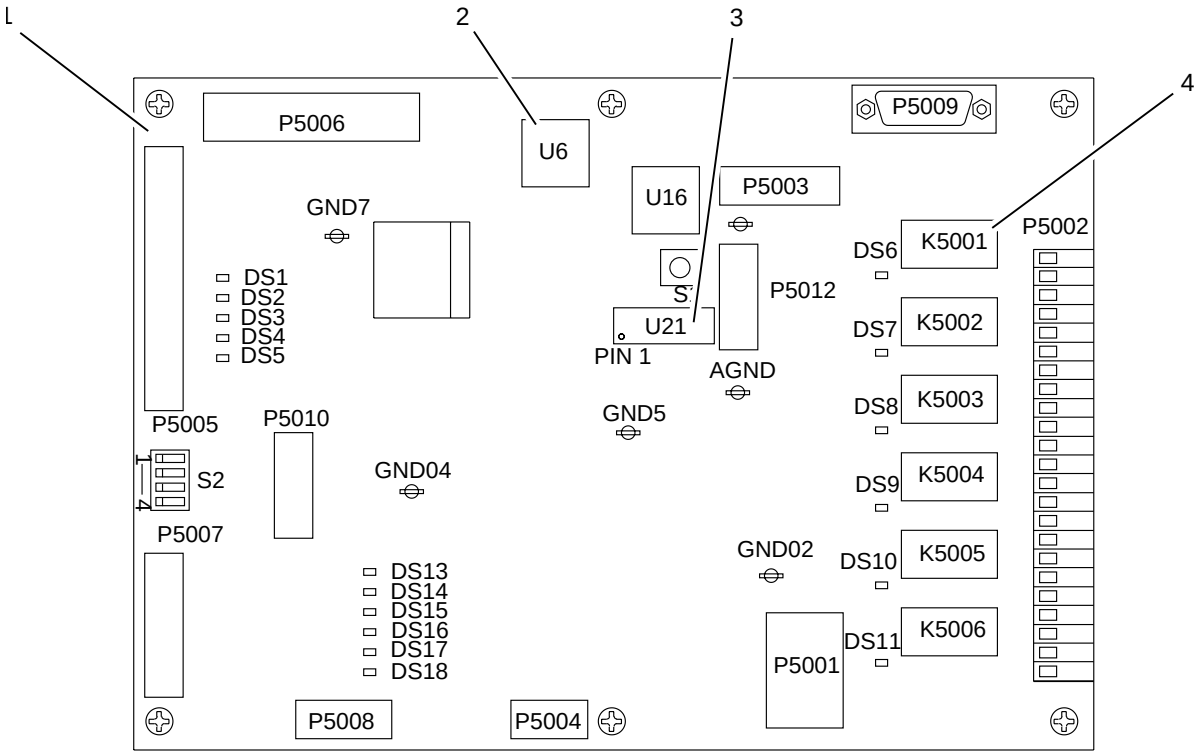


Figure 1 5000 BOARD

Item	Part No.	Description	Quantity	Notes
1	6E5142	5000 BOARD	1	Includes Items 2 - 4
2	8B6711	PROM - Boot	1	U6
3	979762	CLOCK/MEMORY MODULE	1	U21 - not included with 6E5142
4	1E5661	RELAY 8A	6	RELAYS K1 - K5
5	4E9708	OPERATING SOFTWARE for the 5000 BOARD	1	not visible in graphic

Publication History

Publication Date	Publication No.	ECO No.	Changed Pages	File Name	Notes
11DEC02	1F1299	---	All	1f1299.fm	New Publication

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HEALTH IMAGING